

other words, the impact detection sensors 64 may be configured to sense impact prior to impact, i.e., pre-impact sensing. The impact detection sensors 64 may be disposed in the vehicle 10. The impact detection sensors 64 may be pre-impact sensors such as radar, lidar, and vision-sensing systems. The vision systems may include one or more cameras, CCD image sensors, CMOS image sensors, etc. When the impact detection sensors 64 sense the vehicle pre-impact occurs, the processor may receive one or more signals from the impact detection sensors 64 indicating the vehicle pre-impact. In response to receiving the signals from the impact detection sensors 64, the processor may initiate the inflation of the airbag 22.

[0062] In order to receive the signals from the sensors, e.g., the impact detection sensors 64, and to initiate the inflation of the airbag 22, the processor communicates with the sensors, e.g., the impact detection sensors 64, and the inflator 46, e.g., through a direct electrical wiring, through which an analog or a digital signal is transmitted, or through a communication network 66 like CAN (Control Area Network), Ethernet, LIN (Local Interconnect Network) or any other way.

[0063] In operation, the airbag 22 is in the uninflated position, under normal operating conditions of the vehicle 10. In the event of a vehicle pre-impact, the impact detection sensors 64 detect the pre-impact. The impact detection sensors 64 transmit a signal indicating the vehicle pre-impact through the communication network 66 to the computer 60. When the vehicle pre-impact is detected, the computer 60 transmits a signal through the communication network 66 triggering the inflator 46 to inflate the airbag 22 with inflation medium from the uninflated position to the inflated position. When the inflator 46 inflates the airbag 22 to the inflated position, the inflation medium flows into the airbag 22, increasing the pressure in the airbag 22. As the pressure is increased in the airbag 22, the airbag 22 extends upwardly from the rocker 18 and inflation medium flows into the first chamber 24 and the second chamber 26. In the inflated position, the first chamber 24 overlaps one pillar 14 and extends farther outboard from the rocker 18 than the second chamber 26. In an example in which the object spans the first chamber 24 and the second chamber 26, as the object moves towards the vehicle 10, the object impacts the first chamber 24 prior to the second chamber 26. When the object impacts the first chamber 24, the object impacts the first impact surface 54 at an angle transverse to the longitudinal axis of the vehicle 10, which may control kinetic energy of the object through object rotation. Additionally, when the object impacts the first chamber 24, the first chamber 24 may transfer force from the impact to the one pillar 14, which may assist in reducing door intrusion. For example, when the object is the side barrier for the IIHS side barrier impact test, as shown in FIG. 4, the side barrier may impact the first impact surface 54 of the first chamber 26 prior to impacting the second impact surface 56 of the second chamber 26. In such an example, the force of the side barrier impacting the first chamber 24 is transferred via the first chamber 24 to the one pillar 14 because the pressure in the first chamber 24 is independent of the pressure in the second chamber 26. Additionally, the first chamber 24 may control kinetic energy of the side barrier through object rotation, which can reduce the force applied from the side

barrier to the second chamber 26 upon the side barrier impacting the second impact surface 56 of the second chamber 26.

[0064] The disclosure has been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation. “Substantially” as used herein means that a dimension, time duration, shape, or other adjective may vary slightly from what is described due to physical imperfections, power interruptions, variations in machining or other manufacturing, etc. The adjectives “first,” “second,” and “third” are used throughout this document as identifiers and are not intended to signify importance or order. Many modifications and variations of the present disclosure are possible in light of the above teachings, and the disclosure may be practiced otherwise than as specifically described.

1. A vehicle comprising;

a body including two pillars spaced from each other, the body including a rocker extending from one pillar to the other pillar;

an airbag fixed to the rocker and inflatable to an inflated position, the airbag extending outboard of the rocker in the inflated position;

the airbag including a first chamber and a second chamber substantially fluidly separated from each other, the first chamber extending farther outboard of the rocker in the inflated position than the second chamber; and

the first chamber including a first impact surface and the second chamber including a second impact surface, the second impact surface extends generally along the body and the first impact surface extends transverse to the second impact surface.

2. The vehicle of claim 1, wherein the first chamber overlaps the one pillar in the inflated position.

3. The vehicle of claim 1, wherein the second chamber is disposed along the body between the two pillars in the inflated position.

4. The vehicle of claim 1, wherein the second chamber abuts the first chamber.

5. The vehicle of claim 1, further comprising a cover fixed to the rocker and covering the airbag, wherein the cover includes a tear seam and the airbag extends through the tear seam of the cover in the inflated position.

6. The vehicle of claim 1, wherein the airbag extends upwardly from the rocker in the inflated position.

7. The vehicle of claim 1, wherein the body includes a beltline spaced from the rocker and the airbag includes a top surface extending along the first chamber and the second chamber, the top surface is disposed closer to the beltline than the rocker in the inflated position.

8. (canceled)

9. The vehicle of claim 1, further comprising an inflator in fluid communication with both the first chamber and the second chamber.

10. The vehicle of claim 9, further comprising a sensor and a computer in communication with the sensor, the computer is programmed to actuate the inflator based on the sensor sensing a pre-impact.

11. The vehicle of claim 10, wherein the inflator initiates inflation of the first chamber prior to the second chamber.